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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/934,643	08/23/2001	Hideyuki Arakawa	401346	8744

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EXAMINER
LEE, HSIEN MING

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 06/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/934,643	Applicant(s) ARAKAWA, HIDEYUKI	
	Examin r Hsien-Ming Lee	Art Unit 2823	

-- *The MAILING DATE of this communication appears on the cover sheet with th correspond nce address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-7 and 10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-7 and 10* is/are rejected.

7)☒ Claim(s) *1, 5, 6* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Remarks

1. Claims 1, 4-7 and 10 are pending in the application.

Claim Objections

2. Claims 1, 5 and 6 are objected to because of the following informalities: lack of antecedent basis, i.e., "said **first** conductive layer" in claim 1, at line 3; and "said **first** bonding pad" in claim 1, at lines 5, 9; claim 5, at line 8 and claim 6, at line 10. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 4, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (hereinafter refers to as "AAPA") in view of Masahiro et al. (JP 08-186117).

In re claim 1, AAPA in Figs. 8-9 and related text teaches the claimed semiconductor device, comprising:

- a conductive layer 10 (Fig.8);
- a first contact 2 comprising a ball 2 on the conductive layer 10 (Fig.8);
- a bonding pad 6 spaced apart from the conductive layer 10 (Fig.8);
- a second contact 9 on the bonding pad 6 (Fig.8); and

a bonding wire 1 electrically connecting the first contact 2 to the second contact 9, wherein the second contact 9 including one layer of the bonding wire 1 (Fig.9).

In re claims 7 and 10, AAPA in Figs. 8-15 and related text teaches the claimed method and device, comprising:

- joining a first ball 2 at a tip end of a bonding wire 1 to a conductive layer 10 as a first contact (Fig.8);
- joining a first part of said bonding wire 1 (i.e. an angled portion of the bonding wire 1 located under a capillary 4) to a bonding pad 6 *via a second ball 9* (Fig.8);
- mechanically deforming the first part of the bonding wire 1 (Fig.10), wherein the first part of the bonding wire 1 is joined to the bonding pad 6 (Fig. 11);

  wherein said mechanically deforming the bonding wire 1 includes bending and curving the bonding wire 1 on the bonding pad 6 (Fig.10); and the bonding wire 1 is held by the bonding tool 4 and mechanically deforming the bonding wire 1 on the bonding pad 6 by moving the bonding tool 4 with the bonding wire 1 being joined to the bonding pad 6 (Figs. 10-11).

In contrast, AAPA doe not teach mechanically *deforming a second part* of said bonding wire, while said first part of said bonding wire is joined to the bonding pad, so that said bonding wire is *folded onto said first part* of said bonding wire directly opposite said bonding pad; and *joining said second part of said bonding wire to said first part* of said bonding wire on said bonding pad.

Masahiro et al. (JP' 117), however, in an analogous art of a wire bonding (Figs. 3a-3f) teach mechanically deforming a second part of said bonding wire 4, while said first part of said bonding wire 4 is joined to the second conductive layer 9/13, so that said bonding wire 4 is folded onto said first part of said bonding wire 4 directly opposite said second conductive layer 9/13; and joining said second part of said bonding wire 4 to said first part of said bonding wire 4 on said second conductive layer 9/13, i.e. utilizing two-step joining (Figs.3(a)-3(f)) to mechanically deform the bonding wire 4 via moving the capillary tube 1 along a track as shown in Fig.3(c) to bend and curve said bonding wire 4 so that said first and second parts of said bonding wire being lying directly on each other and including one reverse bend 8 (i.e. crowing); and said second part of said bonding wire 4 is folded onto and joined said first part of said bonding wire 4 on said conductive layer 9/13.

Therefore, at the time the invention was made, one of the ordinary skilled in the art would have been motivated to utilize the two-step bonding process as taught by Masahiro et al. in AAPA's method to mechanically deform the second part of said bonding wire 1 of AAPA, while said first part of said bonding wire 1 of AAPA is joined to the bonding pad 6, so that said bonding wire 1 is folded onto said first part of said bonding wire 1 directly opposite said bonding pad; and joining said second part of said bonding wire 1 to said first part of said bonding wire 1 directly on said bonding pad 6 without the second ball 9 of AAPA.

The motivation/suggestions for doing so would be to provide a simple means for bonding two contacts without being restricted to a special bump's structure; shortening a junction distance between two contacts; and improving a bond strength (sections [0044] and [0045]; Masahiro et al.).

In re claim 4, AAPA in view of Masahiro et al. also teach that the conductive layer 10 includes an inner lead 10 (Fig.8).

4. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Masahiro et al. as applied to claims 1, 4, 7 and 10 above, and further in view of Hikita et al. (US 6,133,637).

AAPA in view of Masahiro et al. substantially teaches the claimed device except that the device comprises a base; a first and a second semiconductor elements mounted on the base with a die pad interposed between the base and the semiconductor elements; an external terminal on the rear surface of the base; and a sealing resin sealing the first and the second semiconductor elements.

However, Hikita et al. in an analogous art teach a device (Fig. 25), comprises a base 50, a first 14 and a second 16 semiconductor elements mounted on the base 50 with a die pad 21 interposed between the semiconductor element 14 and the base 50; a sealing resin 22 sealing the semiconductor elements 14 and 16; an external terminal 60 on the rear surface of the base 50; a bonding pad 14a on the first semiconductor element 14; and a bonding pad 16a on the second semiconductor element 16.

Therefore, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to incorporate the device configuration of Hikita with the device of AAPA in view of Masahiro et al, since by this manner it would provide a resin-packaged semiconductor device having a plurality of semiconductor elements, which, in turn, would reduce the manufacturing cost of stacked chips (col. 25, lines 14-20, Hikita et al.).

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (9:00 ~ 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Hsien-Ming Lee
Examiner
Art Unit 2823

June 16, 2003